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Veröffentlichungsversion / Published Version
Zeitschriftenartikel / journal article

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Empfohlene Zitierung / Suggested Citation:

Roth, P. (2015). Including the diary method in the investigation of practices constituting social innovation networks. *Historical Social Research*, 40(3), 331-350. <https://doi.org/10.12759/hsr.40.2015.3.331-350>

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Including the Diary Method in the Investigation of Practices Constituting Social Innovation Networks

Philip Roth*

Abstract: »Integration des Tagesbuchverfahrens in die Untersuchung von Sozialen Innovationsnetzwerke konstituierende Praktiken«. Organizing the early stage of the innovation process, and hence the development of ideas, is of considerable importance for the success of an enterprise. During this stage, decision making is particularly difficult because of both high complexity and high uncertainty. At the same time, these decisions are far reaching because the outcome of the early stage has a substantial influence on the results of subsequent stages. Social network research shows that specific network constellations in particular favor the development of ideas. To promote the development of these constellations, the dynamics of networks have to be understood. However, the insights that have been gained so far are insufficient. To go beyond these insights in the article, initially a research question is developed from a practice-theoretical point of view. The research aim is to explore the constitutive conditions of the practices of initiating and conducting idea-related interactions in the early stage of the innovation process. Subsequently, the article critically examines the given methodological approaches of social network research. It is demonstrated here that the existing research gap is essentially the result of two central methodological shortcomings. To overcome these shortcomings, a mixed-method design that links the diary method with established methods of qualitative network research is proposed and discussed.

Keywords: Qualitative social network analysis, relational sociology, mixed-method design, diary method, network dynamics, network evolution, practice theory.

1. Introduction

Networks of interaction have attracted the attention of innovation research because they give insights as to where new knowledge combinations take place and thus innovations are initiated. However, an advanced understanding of network dynamics is crucial to promote network constellations facilitating the development of ideas. This ability is of considerable importance, particularly for managing the early stage of the innovation process in enterprises. Viewed from a practice-theoretical point of view, a significant need for research becomes apparent.

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From this perspective, it is crucial to inquire into the practices of initiating and conducting idea-related interactions and their constitutive conditions.

In the main part of the article, I will show why both the common quantitative and qualitative methods of network analysis are unsuited for gathering adequate data to provide answers for this array of questions. I will argue that the superficiality of the given insights on network dynamics and the associated need for research are primarily the result of two methodological shortcomings: the *retrospection problem* and the *space-time problem*. Finally, I will propose and discuss a qualitative design integrating the diary method, which better meets the specific methodological needs implicated by the practice-theoretical formulation of the research question and the state of research. The approach suggested in this article thus addresses the demand for more complex method combinations appropriate to the questions of innovation research brought forward in the introduction (Jungmann et al. 2015).

1.1 Concept of Innovation

How are new ideas brought into the world? Early in the innovation debate, Schumpeter gives a noteworthy reply when he writes:

In many cases the true (primary) novelty is a new combination of elements which may have all already been conceivable or may have even existed. But the particular combination has either not been thought of or did not exist so that those cases are true (primary) novelties (Schumpeter 2008, 94f, own translation).

This concept of innovation is remarkable because it accentuates that possibly already-existing concepts are combined. It can be concluded that new ideas do not necessarily emerge from fundamental creative acts but rather emerge from transfers, translations, and combinations. This can be understood in such a way that new ideas emerge from successfully combining techniques and/or practices that have so far been unconnected, or that new ideas can spring from successfully transferring existing solutions to problems that have so far not been applied to other areas. It should not be concluded that innovation is a purely logistic act. Both recognizing different combination possibilities and the actual combining itself demand creativity (Roth 2012). However, it is crucial to understand that innovation originates in connecting what has been unconnected.

Furthermore, Schumpeter relates innovation not only to technical artefacts but to “anything that is done differently in the area of economic activity” (Schumpeter 2008, 91, own translation). In contrast to this, innovation is not restricted to the area of economic activity. It is also recognized that innovation not only refers to technical innovations, realized through new products, but also includes political, economic, social, and other types of innovations (Rammert 2010). Moreover, it is very important to recognize not only that innovations happen in different areas but that relationships exist between them. Innovations

are interdependent (Rammert 2010, 6f; Zapf 1989). Technical innovations facilitate or prevent cultural innovations, and vice versa (Rogers 2003, 240ff).

This means, on the one hand, that innovations originate in places where unconnected knowledge is connected and, on the other hand, that innovations only establish themselves (and hence become innovations) if the relevant environments can be made compatible. Innovations as, indeed, historical events in general, tend to be glorified as the actions of heroic individuals, but the observations above suggest that innovations are much more likely to be the result of different actors interacting; their different points of view and skills offer the starting points for compatible (meaningful) new combinations (Page 2007, 322).

1.2 The Significance of Specific Network Constellations

This nexus draws attention to networks as the place and trace of the distribution of knowledge. A lot of work on this nexus has been conducted in the last decades. Two particular understandings of networks can be distinguished. First, networks are understood as a form of cooperation between formal organizations. Second, networks are understood as the mesh of social relations between actors (not to be confused with social network applications). I will discuss the latter in the following. Thereby, I will focus on the interactions between actors that can be understood as constitutive for specific relations/relationships and hence for the development of network dynamics.

In general, the empirical research on this issue deals with survey-based information about actors and connections between them. The results lead to specific, analyzable relational structures. A main finding is that network constellations providing actors with nonredundant knowledge and unfamiliar points of view foster the development of ideas. Accordingly, the desired networks are characterized by the diversity of personal networks included in the whole network.¹

In line with the fact that the integration of actors in specific network constellations affects the probability that innovations are created, it has to be asked how and under what circumstances these network constellations occur. Besides its theoretical significance (Hollstein 2010, 463), this question also has a practical relevance as the answer makes it possible to design framework conditions suitable for the creation and maintenance of connections relevant for the development of ideas (Müller-Prothmann 2008, 839). To answer this question, the following section describes the most important findings of the analysis of social network dynamics.

¹ A concept of fundamental relevance in this context is Burt's (2004) concept of *structural holes*.

1.3 Approaches to Describe Network Dynamics

As social networks are constituted particularly by defined interactions in a defined time frame, network dynamics result in changes of selection logics or changed circumstances between time frames. The efforts to understand these network dynamics are relatively small compared to the efforts to understand network effects, although the topic is currently very focused (Ahuja, Soda and Zaheer 2012, 434).

Based on Rivera, Soderstrom, and Uzzi (2010), and Crossley (2010, 24), the main findings on network dynamics can be summarized as four main mechanisms:

- *Homophily* is understood as the actors' propensity to establish relationships with other actors who are similar to themselves.
- *Clustering* "means that social networks tend to have a high density of closed triads, or, colloquially, people tend to become friends with the friends of their friends" (Rivera, Soderstrom and Uzzi 2010, 100).
- *Proximity* means that relationships occur more often and are more likely to last if the actors are active in spatial proximity to one another.
- *Repetition* is understood as actors' tendency to maintain relationships and rely on proven interactive partners.

Insofar as all the mechanisms explain the tendency to choose interaction partners with redundant knowledge, perspectives, and personal networks, it can be summarized that these explanations ignore the occurrence and persistence of relationships providing nonredundant knowledge and nonredundant viewpoints. Thus, the connections most significant for creating innovations cannot be explained to a sufficient extent.

The main cause for the insufficient state of research is that the existing approaches to explaining network dynamics are limited to explaining evolving structures of social networks through existing structures (clustering, repetition) or through the actors' (relative) demographic characteristics (homophily, proximity) (see Wasserman and Faust 2007, 89). To develop a more differentiated understanding of network dynamics and particularly of the emergence and existence of relations providing nonredundant knowledge and nonredundant viewpoints, I want to focus network dynamics from a practice-theoretical point of view.

2. Practice-Theoretical Point of View on Network Dynamics

Regarding Reckwitz's classification of cultural theories, one can distinguish between four forms of cultural theories: culturalist mentalism, textualism, intersubjectivism, and practice theory (Reckwitz 2002, 245). I suggest gaining

a microfoundation of network dynamics by following a practice-theoretical approach (Reckwitz 2003; Hillebrandt 2014).²

Such a shift of focus towards practice theory has fundamental conceptual consequences:

- 1) The duality of structure is assumed. That means that structure is both the medium and outcome of practices (Giddens 1997, 52). Research on social network dynamics thus has to focus on the concrete practices that are attributed to constitute these networks (see Bernhard 2008, 121).
- 2) Instead of assuming that actors perform based on homogeneous logical rationalities, it is assumed that actors operate according to an implicit (and potentially inconsistent) practical logic (Bourdieu and Wacquant 2006, 279f; Bourdieu 1993, 127). Regarding the fact that different social fields have distinct practical logics, the specific logics of different social fields become the subject of empirical research.
- 3) Furthermore, empirical research has to focus on concrete practices as embedded in their specific situations, taking both the (implicit) symbolic and the (implicit) material dimensions of action into account (Schmidt 2012, 46; Reckwitz 2003, 291). The consideration of material dimensions is a characteristic of practice theory that promises to be of especially crucial importance for the understanding of the practices constituting network dynamics.

Practices constituting social networks can be understood as interactions that are maintained by existing relationships and interactions leading to the development of new relationships.³ To investigate such practices in studies of innovation, it is necessary to define what specific form of relationship should be focused on. The reason for this is that it can be assumed that network dynamics differ depending on the form of relationship in a particular network, just as the quality of concrete interaction practices does (see Rivera, Soderstrom and Uzzi 2010, 104). For example, it can be assumed that the dynamics of a network of sexual partners follows a different logic than a network of pen-friends (see Yeung 2005). Although valuable conclusions can be drawn from comparison, it makes sense to investigate the different networks separately. It has to be pointed out that the type of relationship characterizing the network and the quality of concrete interaction practices also have to be clearly differentiated regarding the specific type of knowledge transfer. For example, interaction practices can be distinguished regarding relative complexity and fuzziness of the knowledge being transferred (Vakkari 1999; Simonin 1999). Otherwise, there is the risk that very different network dynamics are pooled and remain misunderstood.

² Note that there is no clearly defined practice theory. Instead, there are several differing theories, which might appear similar in their emphasis of materiality, body and practices (see Reckwitz 2002).

³ Interactions or noninteractions which contribute to the disintegration of relationships should also be mentioned here. These are excluded from the reflections in this article.

The focus here is on an *advice network* in and around the research and development department of a global technology enterprise.

The restriction to a concrete field of action also appears appropriate if it is assumed that the requirements of those seeking advice, and consequently the practices of seeking advice, systematically differ by the specific field. Furthermore, the focus here is on informal interactions to a greater extent. Informal interactions are referred to here as interactions that are prescribed neither by workflow organization nor by the instructions of a supervisor. It can be assumed that these reveal more of the logic of how networks are formed.

The analytically necessary focus is on the informal practices of initiating and conducting idea-related interactions by employees of the R&D department of a global technology enterprise. It can be assumed here that the networks formed in this process, as described above, affect the innovative capacity of the company.

Overall, the aim of the investigation is to understand the occurrence of interactions in which actors discuss the ideas they are working on with actors not directly involved in their work, since they are likely to contribute nonredundant knowledge and/or nonredundant viewpoints. Thus, the focus will be on the practices of initiating and conducting such interactions, in particular with respect to the symbolic dimension of these practices and their situational context, understood as the spatiotemporally organized presence of humans and things.

By way of illustration, I want to give some conjectures on the tangible activities referred to as *practices of initiating and conducting idea-related interactions* and particularly on the aspects that could be crucial for understanding the constitution of these practices. For this purpose, I will refer to suggestions from related research. It should be emphasized that these suggestions are just by-products of research conducted with an adjacent focus and thus do not change the need for exploratory research.

An important aspect of the aim of investigation is how employees of R&D identify contact persons. The current state of research provides different suggestions. The discourse on boundary spanners suggests that persons occupying such positions can use their access to a variety of fields, acting as a *tertius iungens* (Obstfeld, Borgatti and Davis 2014, 147f). This means that they bring together people from different fields who can thus benefit from the different perspectives within the group. These boundary spanners might be crucial for the detection of suitable interaction partners, particularly because they are said to provide trust (Granovetter 1985, 490). Beyond this origin, information about potential interaction partners can also be provided by databases and directories, which could also play a crucial role. It is an open question, under which circumstances boundary spanners or expert databases unfold their capabilities.

Furthermore, it can be assumed that idea-related interactions are not always premeditated. Encounters take place more or less by accident, since people often do not recognize either their need for interaction or other persons as potential interaction partners until they run into each other (see Betsch 2005,

264). As Ibert, Müller, and Stein (2014, 130) note, people with discussion needs who do not know whom exactly to address in another department just go to locations where a chance to meet a member of that department casually might present itself. These encounters, which occur more or less by accident, draw attention to temporospatial structures. It must be inquired, at which particular locations these encounters take place. Do coffee makers and copiers play a crucial role? How can these spaces be characterized? Furthermore, one may ask, which particular encounters in which particular situations are recognized as opportunities for initiating or conducting idea-related interactions. Is, for example, the presence of third persons a determinant factor?

Finally, I want to put the focus on the symbolic dimension of interactions. As Blau (2005, 132ff) notes, asking for advice can be connected to the acknowledgment of superiority, if there is no *quid pro quo*. Nevertheless, I do not agree with the assumptions underlying exchange theory; it seems to be important to recognize that these practices do have consequences for the symbolic relations between persons and groups and that the existing symbolic relations between persons and groups do have consequences for the likeliness of the occurrence of, and the kind of, such interactions (see Bourdieu 2005, 140f; White 1992, 65ff). For example, actors could be more likely to seek advice from colleagues who are formally superior but not their direct supervisor.

3. Methodological Problems of the Practice-Theoretical Investigation of Network Dynamics

In this section, I will discuss the limitations of the methods currently used in social network analysis with respect to the aim of the research described previously. In general there are two main lines of research on social networks: the structuralist approach uses exclusively quantitative methods, and relational sociology leans on qualitative methods. As I will demonstrate, the established methods in both fields do not address the specific needs resulting from the practice-theoretical formulation of the research question.

The results of the research on network dynamics presented above are essentially based on quantitative network analyses. The relationships considered here are collected either by a standardized survey of the actors or using process-produced data (for example, e-mail contacts, joint publications, etc.). The standardized survey can be differentiated between open collection, using a network generator (for example, following the pattern “Name the persons with whom you have engaged in certain activities during a certain time”), and closed collection, where persons with whom there is a specific form of relationship are chosen from a list (Heidler 2010; Levin and Cross 2004, 1482; Burt 2004, 360). In many cases, this network data is supplemented with demographic information about the actors.

Network changes can be monitored by running several tests over time. As the network data based on a survey can be collected only at longer intervals, process-produced data is particularly suited to this purpose. However, these kinds of data are usually limited to specific media and exclude other types of interaction.

Newer approaches use game theory to model actors' behavior regarding the development of networks. This method makes it possible to illustrate the interactions of individual attributes, decisions (on the microlevel), and network constellations (on the macrolevel) and thus to test hypotheses (Snijders, van de Bunt and Steglich 2010; Trezzini 2010, 201; Crossley 2010, 24; Gross and Sayama 2009). Although these models include actors' behavior, there is a fundamental incompatibility with the practice-theoretical approach because the modelling requires assumptions about the actors' rationality. Since it is assumed here that actors operate according to an implicit (and potentially inconsistent) field-specific practical logic that is part of the research question, it is not coherently possible to work with such assumptions.

Although most of the research on social networks and particularly on network dynamics has been conducted using longitudinal surveying or process-produced data, there seem to be considerable reasons why those methods cannot provide adequate data to answer the research question raised in chapter 1. The main point is that a practice-theoretical focus demands data that allows explorative and interpretative research. Standardized surveys miss this central requirement. Obviously, qualitative methods need to be applied.

Qualitative methods were first applied to research on social networks in context of *relational sociology* (Häußling 2010; Emirbayer 1997; Mützel and Fuhse 2010) during the last decades. In this context, interviews and observations especially are increasingly included in the survey process to obtain an empirically sound understanding of the significance of specific network constellations and elements (Ibert, Müller and Stein 2014; Glückler and Hammer 2013, 36; Häußling 2006, 149).

As Häußling (2006, 129) suggests, the inclusion of qualitative methods is especially important for the understanding of network dynamics because the practices that change or stabilize networks are conducted based on the agents' construction of reality. Hollstein (2010, 459) and Crossley (2010, 25) agree with this point and add that qualitative methods are particularly suited to investigate network dynamics because they facilitate an advanced understanding by providing a microfoundation and explorative insights.

However, two problems connected with the application of qualitative methods in this context obscure these insights: the *retrospection problem* and the *space-time problem*. I will discuss the application of interviews and observations to reveal the problems.

As mentioned above, it is crucial for the practice-theoretical investigation of network dynamics to regard the idiosyncratic perspectives of the agents consti-

tuting the network. The methods most suited to capture such objects are various forms of interviews. Even though interviews meet the central needs of the aim of investigation, being retrospective, they have a crucial disadvantage. As has been shown, recall biases are particularly apparent in retrospective surveys or interviews on social interactions, and using such methods implies distortions affecting the quality of the data (Schröder et al. 2012, 9; Manger 2006, 229). Regarding our research question, the problem is even greater, insofar as it can be assumed that when an interview is conducted, the relatively rare idea-related interactions that are discussed – especially with new or distant interaction partners – are very likely to have occurred long before. Furthermore, it can be assumed that detailed information about the interaction context is easy to forget. Because of that, interviewees probably forget specific interactions systematically, have false memories, and cannot remember the relevant details clearly. Hence, one main methodological problem in the application of qualitative interviews in the analysis of social network dynamics is the *retrospection problem*.

Considering the perspectives of the actors and the symbolic connotation of practices, it is crucial from a practice-theoretical point of view to take into account tangible practices in their material embeddedness. Observations in particular facilitate an appropriate methodical access to this dimension (see Häußling 2006). Beyond minor problems like the limited ability of the observer to interpret the observed field-specific action and the possibility that certain consultations take place in more intimate settings where the presence of an observer could influence the practices, the main problem regarding the application of observations is the *space-time problem*. Though where and when the idea-related interactions take place are part of the research question, conducting observations requires first deciding where and when to observe. Thus, by making this decision, the researcher makes an *ex ante* assumption that has a deep and uncontrolled effect on the results. The consultation practices take place with no restrictions regarding space and time, and therefore it is not clear where and when observations should be made. As observations without restrictions regarding space and time (if even possible) would represent a huge strain on both the observer and the observed, observation without restrictions is not a suitable method in this case (Zeihner and Zeihner 1994, 207). On the other hand, observations restricted to specific spaces and times miss the exploratory aim of the investigation. For example, employees of an R&D department might conduct their idea-related interactions in a nearby restaurant to be undisturbed and have the opportunity to reward the advice they receive with a dessert. Observations are likely to miss such practices systematically. Thus, the second methodological main problem to face is the *space-time problem*.

As shown above, though both methods meet central needs of the research objectives, they are associated with critical shortcomings. To diminish these shortcomings and continue to meet the central needs, I suggest including the diary method as a starting point in a mixed-method design.

4. Including the Diary Method

To counter both the space-time problem and the retrospection problem, I suggest collecting data using a mixed-method design including the diary method as a starting point. I will start this chapter by introducing the diary method and the way I want to use it. Afterwards, I will show how both methodological problems identified above are countered by the suggested process. Finally, I will discuss the challenges related to the application of the design.

4.1 Suggesting a Process

The diary method in general can be understood as a prestructured self-observation. The participants are asked to keep diaries that tell them more or less specifically how, in which form, and in what time frame they should record which observations (Alaszewski 2006, 2). The involvement of the test persons as self-observer makes it possible to document practices that are otherwise difficult to observe (Kunz 2015, 6f; Alaszewski 2006, 113).

In detail, I suggest combining event-based standardized diaries with focused interviews and possibly observations.

Event-based diaries are distinct from time-based diaries. The difference is the trigger condition, which prescribes under what conditions recording should take place (see Rausch, Kögler and Laireiter 2012, 183). Time-based diaries urge participants to record at stipulated points in time. Event-based diaries urge participants to record defined events immediately after they happen. As time-based diaries are more suited to documenting regular everyday events, aiming to describe patterns over time (Laireiter and Thiele 1995, 146), they are not suitable here since relatively rare events are to be recorded.

The different diary methods vary considerably in terms of standardization. There are very open instruments that allow the test persons to write free texts on specific practices and also include supplementary materials such as photos and drawings (see Kunz and Pfadenhauer 2014). In contrast, there are completely standardized procedures following (for example) the Rochester Interaction Record (RIR), which has been validated several times and is available in very different variations. The RIR focuses on documenting interactions and their quality (Laireiter and Thiele 1995, 137; Reis and Wheeler 1991; Wheeler and Nezelek 1977). Insofar as the participants in this case are scientists whose time for recording is scarce, it seems to be sensible to use standardized diaries to avoid refusals and dropouts and ensure adequate and relatively comparable data quality.

Put in concrete terms, the participants are provided with a clear definition of the trigger condition, information about how long to record the defined events, and documentation sheets including questions which have to be answered for each of the defined events.

A trigger condition adequate for our research aims could be: Please record interactions in which you discussed ideas related to current or potential issues of your work with people not formally involved in this work. It is crucial for the validity of the data collection to clearly explain the trigger condition to the participants. Otherwise, there is the risk that events are recorded that are not the subject of the investigation, or that relevant events are not recorded (Rausch, Kögler and Laireiter 2012, 187; Beal and Weiss 2003). It is therefore advisable to deal with any uncertainties about this as part of a preliminary briefing (Alaszewski 2006, 77f).

Interviews here will be conducted after one week of recording. This should ensure both that an adequate amount of interactions occur and that the period between an event and the interview focusing on the event is short.

In addition to using closed questions, data quality can furthermore be improved by limiting the number of questions on the documentation sheet. This decreases the chance of complete nonresponse and dropout. Here I suggest asking four questions for each recorded interaction. First, I want to find out about the history of the relationship by asking whether there have been interactions with this person before and giving, for example, these choices:

- No
- Yes, but we did not exchange knowledge on work-related issues
- Yes, but only in the framework of joint projects
- Yes, we exchanged views on our ideas in an informal framework

The second question addresses the (organizational) distance between the involved persons. Levels of distance could be defined, for example, by affiliation with the same team, division, enterprise, or branch. The third question addresses the ascribed outcome of the idea-related interaction. Here the results of research on this outcome conducted by Cross et al. (2001) or Hargadon and Bechky (2006), among others, can be used to give answer options. Given these results, outcome can be assigned, for example, to the following categories:

- Receive nonredundant and relevant knowledge
- Receive information about where to find relevant knowledge
- Reformulation of the problem
- Validation
- Legitimation
- Other (Please specify)

Finally, an open question should be asked on a brief description of how the interaction came about and its context. On the one hand, this helps to answer the research question by obtaining relevant information that can be addressed in more detail in the interview. On the other hand, answering the open question has a positive impact on the test person's memory in the interview. The result of this phase is an overview of the idea-related interactions executed by a participant in the defined period plus rough information about selected qualities of

the recorded interactions. Based on this, it is possible to select and focus on interactions in focused interviews.

The self-observer's records are a categorized overview of the consultation activities that can also be described as an egocentric network. On the one hand, this makes it possible to classify individual interactions and see them relative to the interactions aggregated. On the other hand, a theoretical sampling of the consultations forming the focus of the interviews can also be carried out. The records, for example, enable the interviewer to concentrate disproportionately on those consultations in which relatively different viewpoints collide or actors discuss their ideas with each other for the first time. According to research, both happen comparatively rarely, so it seems promising to compare these with consultations involving similar perspectives or established idea discussion relations. Accordingly, items in the self-report form have to be selected so that categories that enable theoretically relevant cases to be identified are compiled (Glaser and Strauss 2010, 65). Since the theory in the sense of grounded theory changes during the course of the research process, so does what is regarded as theoretically relevant (ibid., 63; Charmaz 2003, 265). To account for theory developments in the sampling, the items in the self-observer form can be modified accordingly. However, the key questions should be retained as much as possible so that classifications can still be made.

The main goal of the focused interviews is to find out how the interactions occurred. For that purpose, semistructured interviews address the issues introduced above. Thereby, it is particularly important to generate narratives which enable conclusions to be drawn about atheoretical knowledge. Furthermore, the information collected in the documentation sheet can be validated and nuanced. Here too it is pertinent that the questions in the interview guideline change during the research process as the theoretical relevance changes with the developing theory.

It also seems appropriate to include observations at the sites identified as relevant by means of the presented process.

4.2 Advantages of the Suggested Process

Both the space-time problem and the retrospection problem are countered by the suggested design.

The space-time problem is countered insofar as the self-observer is necessarily present at each interaction he or she participates in. For example, the abovementioned interactions in a restaurant would be captured by self-observations. Hence, there is no need for an *ex ante* decision about where and when to observe.

Apart from that, it is important to consider that the subject knowledge of the participants, vital to identify cases, cannot replace the perspective of the theoretically trained researcher. Although the explorative and interpretative capabilities achievable by observations in tangible situations cannot be achieved by

retrospective interviews, I am sure it is worth compromising at this point. From a practice-theoretical point of view, there is no doubt about how important it is to observe tangible practices. But the suggested approach seems to approximate the ideal best, and as mentioned above, it is possible to attach observations at a later stage of the research process if insights from a first set of interviews indicate where and when to observe.

It is much easier to accept this compromise because the retrospection problem, which is a central and unsolved problem especially in survey-based research on social networks, is considerably diminished through the described approach. This is achieved primarily by conducting interviews relatively close in time to the interactions and thereby reducing the time for memories to decay. Compared to alternative methods, a lower degree of distortion due to recall biases can be assumed. This increases the validity of the data. It is therefore also desirable not to use the two methods sequentially. This can be managed, for example, if the diary is kept over two calendar weeks and the interviews are conducted on Fridays. If the researcher can look at the participant's record on a daily basis (which is possible with online surveys, for example), interviews could also be conducted at the end of the day or even immediately after the record has been entered.⁴

The recording of the self-observers also has a positive effect on the validity of the data during the interview. The act of recording and the record itself help participants to remember the concrete consultation situations. For example, participants asked about idea-related interactions in the week before might particularly remember interactions that were scheduled and framed as such. Interactions conducted occasionally while waiting for a coffee are likely not to be remembered. Sensitizing participants to such events and inviting them to record them helps counteract this distortion because the act of recording facilitates recall. Furthermore, the records serve as a reminder during the interview situation.

4.3 Challenges Related to the Application

The mixed-method design described above fulfils the main requirements of the practice-theoretical conception of the object of investigation and the research question. In the following, critical factors for the successful application of the design will be discussed. Since much is known about successfully conducting focused interviews and observations, I will concentrate on the application of the diary method and the combination with focused interviews.

A distinctive feature of the suggested design is the strong involvement of the participants. Thus, the main challenge is to gain participants' willingness to integrate the recording of idea-related interactions into their everyday life. This point

⁴ This is supposing the participant is flexible enough.

is extra crucial if, as in this case, participants' time and attention is widely absorbed by their work.

Considering that it is, as already mentioned, important to keep the effort required from the participants as low as possible, I suggested using closed questions and limiting the number of questions to a minimum. Furthermore, it is important to convey that fact in the briefing.

Another important factor related to the effort is the ease of use of the documentation sheets (see Venkatesh and Davis 1996). If it is uncomfortable to carry the documentation sheets to initiate the recording process or to conduct recording, participation will decrease.

In this context, it is interesting to consider digital documentation sheets that can be filled in via mobile devices. The application of such sheets requires that participants be equipped with adequate mobile devices and authorized to use them wherever they are. Otherwise, the use of a digital mobile version could result in distortions. If the requirements are met, there are a few striking advantages. As Bolger et al. (2003) note, the use of mobile devices helps to better integrate the recording process into the participant's natural environment and thereby increases the ease of use because they do not have to carry more with them than usual.

Furthermore, collecting diary entries online makes it easier to conduct timely interviews since the scientist is informed about the entries as they occur and can ask for an interview appointment immediately. This reduces memory errors and increases participants' motivation and trust through the higher perceived attention. Such procedures are preferable to paper and pencil entries as they also record when an entry was made. This is important as it can counteract participants' tendencies to complete the diary only at the end of the day or after several days despite agreements to the contrary (Stone et al. 2002).

Ease of use and low effort do not result solely from the design of the documentation sheets. It is also crucial to clearly explain the use and especially the trigger condition to the participants. Ambiguous regulations produce confusion and hence reduce willingness to participate. Furthermore, vague trigger conditions raise the risk that events are recorded that are not the subject of the investigation, or that relevant events are not recorded (Rausch, Kögler and Laireiter 2012, 187; Beal and Weiss 2003). It is therefore advisable to deal with any uncertainties about this as part of a preliminary briefing (Laireiter and Thiele 1995, 147f).

Beyond the preliminary briefing, contact with test persons throughout the survey has a positive impact on the quality of the data by resolving any uncertainties and positively influencing participants' motivation and trust (Laireiter and Thiele 1995, 147f). The nonsequential method combination proposed here allows contact to be maintained naturally as part of the interviews (Zeiher and Zeiher 1994, 209).

Finally, I want to draw attention to the positive effect of the perceived significance of the research project and the contribution of the participants. Both

should be addressed in the context of the briefing. More important than the explanations of that issue given by the scientist are positive statements from high-ranking members of the group. Besides the briefing, such statements and attention in other contexts, like articles in company magazines or lectures, can legitimize the research effort.

5. Summary and Outlook

The starting point for the above considerations is that specific network constellations are thought to be responsible for the innovation capacity of actors and enterprises, but it has not been sufficiently clarified which factors are crucial for networks to develop. The question is also relevant from a practical point of view as the development of preferred network constellations can be influenced positively and actively only if the relevant points of leverage have been identified. However, the insights that have been gained so far are insufficient. We are seeing merely the beginning efforts to understand the dynamics of networks. To go beyond the insights we have, I proposed following a practice-theoretical approach of relational sociology, as it is crucial to inquire into the constitutive conditions of the practices of initiating and conducting idea-related interactions.

I showed why both the common quantitative and qualitative methods of network analysis are unsuited for gathering adequate data to provide answers for this array of questions. I identified two main methodological problems: the retrospection problem and the space-time problem. Finally, I outlined a qualitative design integrating event-based diaries and focused interviews as a possible solution to the two methodological problems.

The employees of the R&D department submit information characterizing an idea-related interaction, immediately after the consultation if possible, according to the researcher's requirements. This information gives the researcher an overview of the idea-related interactions. This makes it possible to conduct interviews about interactions determined theoretically relevant immediately after they take place. The interviews should highlight how and under what conditions these consultations came about. It should also be possible to construct a differentiated picture of the information gained from the diary questions by asking the respondent to elaborate his or her choice of answers.

A comparative analysis of how different idea-related interactions are conducted will help to establish patterns. Alongside the mechanisms designated by quantitative network research, it is expected that additional elements and relationships will be identified that help to explain network dynamics more fully and in a more differentiated way.

Of particular interest are questions about how those consultations that link actors with different subject-related perspectives differ from others in how they come about and under what conditions initial consultations take place.

The methodological approach here outlined is to be applied in a technology enterprise. To further differentiate the findings gained in this way and to better understand them in a comparison, it seems useful to investigate comparable practices in related fields using the same approach. First of all, it makes sense to include researchers and developers in other enterprises in the investigation. Investigating different industries, cultures, or companies of different sizes will generate further insights. It also seems promising to compare the consultation practice of entrepreneurs who set up and conduct consultations in a less pre-structured context. Another promising test field is represented by scientists in organizations such as universities, whose research is generally less application oriented and who are thought to be more open (Amin and Roberts 2008).

This investigation is expected to identify previously undetected elements and correlations that are relevant for understanding the consultation practice. These contribute to explaining the dynamics of specific forms of networks and have two possible consequences. First, it seems useful to characterize the specific interaction practices – for instance, in relation to the complexity of the knowledge that has to be transferred – and use these as a basis for comparisons. It would then be possible to relate specific network dynamics to the characteristics of the underlying interaction practices, which would allow a differentiated explanation of the dynamics. Second, the findings, which are obtained in an exploratory way, can be used as an empirical basis to design standardized quantitative surveys. This will enable researchers to empirically test the robustness of theories that have been developed on a qualitative basis.

Based on these developed theories, it will be possible to gain a better understanding of how innovations come about. This understanding will also facilitate the development of ideas by shaping framework conditions that stimulate crucial idea-related interactions.

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